

eunix: whoami

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A reimplementaion of `whoami` for my own edification.

1a `< * 1a>≡`
`<Include headers. 2a>`

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`<Define constants. 3d>`

`<Forward declarations. 3a>`

`<Define the main function. 1b>`

`<Define the usage function. 3b>`

Root chunk (not used in this document).

The main Function

1b `<Define the main function. 1b>≡`
`int main(int argc, char *argv[])`
`{`

`<Process given options. 3c>`

`<Print the user name associated with the current effective user ID. 3e>`

`return 0;`

`}`

This code is used in chunk **1a**.

Defines:

`argc`, used in chunk **3c**.

`argv`, used in chunk **3c**.

`main`, never used.

Include Headers

Include the core input and output functions from the C standard library.

2a `<Include headers. 2a>≡`
`#include <stdio.h>`

This definition is continued in chunk 2.

This code is used in chunk 1a.

Defines:

`EOF`, used in chunk 3c.

`printf`, used in chunks 3b and 4d.

From `sys/types.h` import `uid_t`, a data type for user IDs.

2b `<Include headers. 2a>+≡`
`#include <sys/types.h>`

This code is used in chunk 1a.

Defines:

`uid_t`, used in chunk 3.

From `pwd.h` import the struct, `passwd`, which notably includes the member, `pw_name`, and has a constructor function, `getpwuid`.

2c `<Include headers. 2a>+≡`
`#include <pwd.h>`

This code is used in chunk 1a.

Defines:

`getpwuid`, used in chunk 4c.

`passwd`, used in chunk 3e.

`pw->pw_name`, used in chunk 4e.

From `unistd.h` import the function, `geteuid`, which returns the effective user ID of the calling process.

2d `<Include headers. 2a>+≡`
`#include <unistd.h>`

This code is used in chunk 1a.

Defines:

`geteuid`, used in chunk 4a.

Include the GNU `getopt` function from the GNU C Library.

2e `<Include headers. 2a>+≡`
`#include <getopt.h>`

This code is used in chunk 1a.

Defines:

`getopt`, used in chunk 3c.

“The `getopt` function gets the next option argument from the argument list specified by the `argv` and `argc` arguments. Normally these values come directly from the arguments received by `main`.” – GNU, 2017

The `usage` Function

Define the `usage` function, which displays information about how to use `whoami`.

3a *<Forward declarations. 3a>≡*
`void usage();`
 This code is used in chunk **1a**.
 Uses `usage` **3b**.

3b *<Define the usage function. 3b>≡*
`void usage()
 {
 printf("Usage: whoami\n");
 }`

This code is used in chunk **1a**.

Defines:

`usage`, used in chunk **3**.

Uses `printf` **2a**.

Processing Options

If any options are given, complain about the first one (via `getopt`), print the `usage` information, and return a nonzero status code.

3c *<Process given options. 3c>≡*
`if (getopt(argc, argv, "") != EOF) {
 usage();
 return 1;
}`

This code is used in chunk **1b**.

Uses `argc` **1b**, `argv` **1b**, `EOF` **2a**, `getopt` **2e**, and `usage` **3b**.

Printing the Current User's Name

Define a constant, `NO_UID`, to represent the case when `geteuid` returns `-1`, which in `whoami` will signify failure to find the user ID.

3d *<Define constants. 3d>≡*
`uid_t NO_UID = -1;`

This code is used in chunk **1a**.

Defines:

`NO_UID`, used in chunk **4b**.

Uses `uid_t` **2b**.

Declare the variables `uid`, to store the current user ID, and `pw`, to store further information about the current user.

3e *<Print the user name associated with the current effective user ID. 3e>≡*
`uid_t uid;
 struct passwd *pw;`

This definition is continued in chunk **4**.

This code is used in chunk **1b**.

Defines:

`pw`, used in chunk **4**.

`uid`, used in chunk **4**.

Uses `passwd` **2c** and `uid_t` **2b**.

Get the effective user ID and store it as `uid`.

4a *<Print the user name associated with the current effective user ID. 3e>+≡*
`uid = geteuid();`

This code is used in chunk 1b.
 Uses `geteuid` 2d and `uid` 3e.

Check whether the effective user ID is `NO_UID`, in which case we won't be able to *<find a user with a matching uid 4c>*.

4b *<the user ID is NO_UID 4b>≡*
`uid == NO_UID`

This code is used in chunk 4d.
 Uses `NO_UID` 3d and `uid` 3e.

Search the user database for an entry with a matching `uid`. If `getpwuid` fails, it returns a null pointer.

4c *<find a user with a matching uid 4c>≡*
`pw = getpwuid(uid)`

This code is used in chunk 4d.
 Uses `getpwuid` 2c, `pw` 3e, and `uid` 3e.

If *<the user ID is NO_UID 4b>* or we're unable to *<find a user with a matching uid 4c>*, print a descriptive error message and return a nonzero status code.

4d *<Print the user name associated with the current effective user ID. 3e>+≡*
`if ((<the user ID is NO_UID 4b> || !(<find a user with a matching uid 4c>))) {`
 `printf("Cannot find name for user ID %lu\n",`
 `(unsigned long int) uid);`
 `return 1;`
`}`

This code is used in chunk 1b.
 Uses `printf` 2a and `uid` 3e.

4e *<Print the user name associated with the current effective user ID. 3e>+≡*
`puts(pw->pw_name);`

This code is used in chunk 1b.
 Uses `pw` 3e and `pw->pw_name` 2c.

Full Listing

```

1  #include <stdio.h>
2  #include <sys/types.h>
3  #include <pwd.h>
4  #include <unistd.h>
5  #include <getopt.h>
6
7
8  uid_t NO_UID = -1;
9
10
11 void usage();
12
13
14 int main(int argc, char *argv[])
15 {
16     if (getopt(argc, argv, "") != EOF) {
17         usage();
18         return 1;
19     }
20
21     uid_t uid;
22     struct passwd *pw;
23     uid = geteuid();
24
25     if (uid == NO_UID || !(pw = getpwuid(uid))) {
26         printf("Cannot find name for user ID %lu\n",
27             (unsigned long int) uid);
28         return 1;
29     }
30     puts(pw->pw_name);
31
32     return 0;
33 }
34
35
36 void usage()
37 {
38     printf("Usage: whoami\n");
39 }

```

Chunks

⟨* [1a](#)⟩ [1a](#)
 ⟨Define constants. [3d](#)⟩ [1a](#), [3d](#)
 ⟨Define the **main** function. [1b](#)⟩ [1a](#), [1b](#)
 ⟨Define the **usage** function. [3b](#)⟩ [1a](#), [3b](#)
 ⟨find a user with a matching **uid** [4c](#)⟩ [4c](#), [4d](#)
 ⟨Forward declarations. [3a](#)⟩ [1a](#), [3a](#)
 ⟨Include headers. [2a](#)⟩ [1a](#), [2a](#), [2b](#), [2c](#), [2d](#), [2e](#)
 ⟨Print the user name associated with the current effective user
 ID. [3e](#)⟩ [1b](#), [3e](#), [4a](#), [4d](#), [4e](#)
 ⟨Process given options. [3c](#)⟩ [1b](#), [3c](#)
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References

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